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Report on the individual review of the annual submission of Germany submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Germany, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 8 to 13 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Tinus Pulles (Netherlands) and Ms. Kristina Saarinen (Finland); energy – Mr. Ricardo Fernandez (European Union), Mr. Akira Osako (Japan) and Mr. Moshe Yanai Axelrod (Israel); industrial processes and solvent and other product use – Mr. Joseph Amankwa Baffoe (Ghana) and Mr. Jacek Skoskiewicz (Poland); agriculture – Ms. Janka Szemesová (Slovakia) and Mr. Marcelo Theoto Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Ms. Maria Fernanda Alcobé (Argentina), Mr. Matt Searson (Australia) and Mr. Richard Volz (Switzerland); and waste – Mr. Eduardo Calvo (Peru) and Mr. Igor Ristovski (the former Yugoslav Republic of Macedonia). Ms. Saarinen and Mr. Theoto Rocha were the lead reviewers. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Germany, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team's (ERT's) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Germany was carbon dioxide (CO_2), accounting for 87.5 per cent of total GHG emissions[1] expressed in carbon dioxide equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (5.9 per cent) and methane (CH_4) (5.2 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.4 per cent of the overall GHG emissions in the country. The energy sector accounted for 83.7 per cent of total GHG emissions, followed by the agriculture sector (7.4 per cent), the industrial processes sector (7.3 per cent), the waste sector (1.4 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 939,083.31 Gg CO_2 eq and decreased by 25.0 per cent between the base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of carbon dioxide equivalent excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base-year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		CO_2	1 042 065.70	1 042 065.70	930 857.03	851 111.47	785 602.59	829 401.50	810 441.13	821 717.69	–21.1
		CH_4	108 798.07	108 798.07	91 940.73	53 158.08	51 132.98	50 052.20	48 696.50	48 706.17	–55.2
		N_2O	85 321.38	85 321.38	79 203.03	63 140.58	63 139.96	54 561.73	56 846.44	55 797.88	–34.6
		HFCs	7 007.79	4 592.29	7 007.79	8 782.48	9 307.44	8 876.51	9 153.37	9 345.59	33.4
		PFCs	1 792.11	2 629.69	1 792.11	495.52	357.83	302.29	241.44	208.95	–88.3
		SF_6	6 779.16	4 641.63	6 779.16	3 114.56	3 065.05	3 194.04	3 315.68	3 307.03	–51.2
KP-LULUCF	Article 3.3[b]	CO_2				–3 259.15	–3 096.21	–3 325.89	–3 546.41	–3 767.79	
		CH_4				IE, NO	IE, NO	IE, NO	IE, NO	IE, NO	
		N_2O				0.05	0.08	0.12	0.16	0.21	
	Article 3.4[c]	CO_2	NA			–46 827.37	–46 767.54	–46 727.90	–46 675.10	–46 631.61	NA
		CH_4	NA			3.58	5.08	3.54	1.46	1.85	NA
		N_2O	NA			64.77	64.97	64.48	63.86	63.81	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, of the Kyoto Protocol, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2 eq							*Change (%)*
		Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		Energy	1 019 026.26	1 019 026.26	902 073.39	810 224.95	753 121.60	792 256.11	772 824.79	786 030.46	–22.9
		Industrial processes	97 874.54	94 159.08	96 764.39	78 756.79	71 887.03	68 529.94	69 282.26	68 253.85	–30.3
		Solvent and other product use	4 538.56	4 538.56	3 614.92	1 874.24	1 687.92	1 911.18	1 832.57	1 756.08	–61.3
		Agriculture	87 821.21	87 821.21	75 763.59	71 577.56	69 588.43	68 367.71	70 362.81	69 490.36	–20.9
		Waste	42 503.64	42 503.64	39 363.56	17 369.17	16 320.83	15 323.33	14 392.14	13 552.56	–68.1
		LULUCF	NA	–24 518.08	–24 331.61	–7 849.86	–5 084.18	–4 693.92	–4 086.60	–3 487.84	NA
		Total (with LULUCF)	**NA**	**1 223 530.68**	**1 093 248.24**	**971 952.84**	**907 521.64**	**941 694.36**	**924 607.96**	**935 595.47**	**NA**
		Total (without LULUCF)	**1 251 764.22**	**1 248 048.77**	**1 117 579.85**	**979 802.70**	**912 605.83**	**946 388.27**	**928 694.56**	**939 083.31**	**–25.0**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				–5 331.54	–5 400.10	–5 652.40	–5 892.69	–6 134.05	
		Deforestation				2 072.45	2 303.97	2 326.62	2 346.43	2 366.47	
		Total (3.3)				**–3 259.10**	**–3 096.13**	**–3 325.78**	**–3 546.25**	**–3 767.57**	
	Article 3.4[d]	Forest management				–46 759.02	–46 697.48	–46 659.89	–46 609.78	–46 565.95	
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	NA			NA	NA	NA	NA	NA	NA
		Total (3.4)	**NA**			**–46 759.02**	**–46 697.48**	**–46 659.89**	**–46 609.78**	**–46 565.95**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, of the Kyoto Protocol, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Germany also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. The list of other materials used during the review is provided in annex II to this report.

2. Question(s) of implementation raised in the 2013 annual review report

9. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

10. Table 3 contains the ERT's overall assessment of the annual submission of Germany. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table. In response to a draft version of this report, Germany informed the ERT that the recommendations made in paragraphs 23, 30, 36, 37, 41, 44, 45, 50, 54, 56, 61 and 63 of this report have been implemented in the 2015 annual submission (or partly implemented in the case of the recommendation in para. 23). The ERT welcomes the Party's efforts in this regard, and notes that the changes will be reviewed by a future ERT.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: none
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: none
KP-LULUCF	Complete	

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Not sufficiently transparent	Please see paragraph 18 below for category-specific findings
Time-series consistency	Sufficiently consistent	
The ERT's findings on QA/QC procedures	Sufficient	Germany has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan. Please see paragraph 54 for a category-specific recommendation
The ERT's findings on transparency	Sufficiently transparent	Please see paragraphs30, 31, 35–36, 45, 49 and 50, 53 and 56 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

11. The NIR described the national system for the preparation of the inventory. As indicated by the Party in its NIR, there were no changes to the inventory planning process.. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Germany submitted in 2013,[3] therefore remains relevant.

Inventory preparation

12. Table 4 contains the ERT's assessment of Germany's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Germany

Issue	*ERT assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the	Yes	Level and trend analysis performed, including and excluding LULUCF

[3] FCCC/ARR/2013/DEU, paragraphs 9–12.

Issue	*ERT assessment*	*ERT findings and recommendations*
IPCC good practice guidance for LULUCF?		
Approach followed?	Both tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Tier 1	See paragraph 13 below
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 6.1% Trend = 6.3%	
Quantitative uncertainty (excluding LULUCF)	Level = not provided Trend = not provided	

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

13. The Party reported in its 2013 NIR that for the 2014 and subsequent annual submissions, tier 2 uncertainty calculations would no longer be carried out via a separate procedure once every three years, as was the case until 2010. The aim was to directly integrate these calculations into the Central System of Emissions and run those calculations annually as of the 2014 annual submission. However, the new procedure had not yet been implemented in time for this year's annual submission and hence the tier 1 approach was used, as previously in the years when a tier 2 uncertainty was not applied.

Inventory management

14. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by Germany in its NIR. The description

of the inventory management process, as contained in the report of the individual review of the annual submission of Germany submitted in 2013,[4] remains relevant.

5. Follow-up to previous reviews

15. The ERT commends Germany for its transparent reporting of the follow-up to previous reviews in table 334, section 10.4, of the NIR.

16. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

17. The energy sector is the main sector in the GHG inventory of Germany. In 2012, emissions from the energy sector amounted to 786,030.46 Gg CO_2 eq, or 83.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 22.9 per cent. The key drivers for the significant fall in emissions are: the substantial changes in the fossil-fuel mix (from local lignite to natural gas); the higher energy and technical efficiencies resulting from the decommissioning of obsolete installations after Germany's reunification; and the very strong uptake of renewable energy sources. Within the sector, 46.4 per cent of the emissions were from energy industries, followed by 19.8 per cent from transport, 17.7 per cent from other sectors and 14.6 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 0.9 per cent and fugitive emissions from solid fuels accounted for 0.4 per cent. The remaining 0.1 per cent were from other (energy).

18. Germany has reported substantial recalculations of emissions in the energy sector in its 2014 annual submission, particularly of CO_2. The recalculations increased emissions in the energy sector by 12,252.54 Gg CO_2 eq, or 1.6 per cent, for 2011, and increased total national emissions by 1.3 per cent. The recalculations also affected previous years of the time series, with increases in emissions of 3,448.48 Gg CO_2 eq for 2010, 1,979.17 Gg CO_2 eq for 2009 and 5,413.73 Gg CO_2 eq for 2008. Overall, the recalculations led to an increase in CO_2 emissions of 23,280.44 Gg CO_2 between 2008 and 2011 compared with the 2013 annual submission. The most significant recalculations affected, in particular, CO_2 emissions from other sectors and from manufacturing industries and construction. Chapter 10 of the NIR explains in detail where the recalculations have taken place at the category level, but the ERT considers that there should be greater focus on explaining the recalculations that led to the largest changes. For example, Germany recalculated the emissions from other sectors as a result of changes in the energy balance and, particularly, in natural gas consumption. However, it was not clear to the ERT why the CO_2 emissions from natural gas consumption for 2011 had been underestimated by 8.1 per cent in the 2013 annual submission compared with the 2014 annual submission. In response to questions raised by the ERT during the review, Germany provided transparent explanations for these recalculations. According to the Party, there was a methodological change in the national energy balance because of the use of additional statistical data, which led to a revision of the natural gas consumption in small combustion plants from 2005 to 2011. In particular, the recalculation for 2011 was the result of the combined effect of this improvement in the energy balance on the one hand, and the replacement of the preliminary energy balance with the final energy balance on the other. According to Germany, the final energy balance

[4] FCCC/ARR/2013/DEU, paragraph 14.

had the greatest impact on the recalculation for 2011. The ERT recommends that Germany provide more detailed information on the most significant recalculations in the energy sector in its future annual submissions, and, to the extent possible, that the Party link the qualitative explanations for the major recalculations with the quantitative information reported in CRF table 8(a).

19. One of the main reasons cited by Germany for the regular recalculations is the late availability of the final energy balance. During the review, the Party informed the ERT that the provisional energy balance that was used for preparing the 2014 annual submission was available in August 2013 and that the final energy balance was only published in June 2014. The national energy statistics depend on the readiness of the 16 Länder (federal subdivisions), including the completion of all data collection and quality checks. The ERT notes that the Working Group on Energy Balances (AGEB) is contractually bound, via the Federal Ministry for Economic Affairs and Energy, to provide the national energy balance. As mentioned in the NIR, the use of a coordinated schedule ensures that a provisional energy balance for the last reported year is prepared on time and is transmitted to the Federal Environment Agency by 31 July of each year for the purposes of inventory preparation. The preliminary energy balance from AGEB is based on data already available from the German Federal Statistical Office. The NIR also states that efforts are made to transmit the final energy balance by 28 February of the year t–2. The ERT appreciates the significant challenges of collecting and quality-checking the data from the 16 Länder for the purpose of compiling the national energy statistics. The ERT also notes Germany's observations regarding the major efforts made by all involved institutions over the last years to improve the data flow and timeliness of the national energy balance. However, the ERT also notes that the long period of time between the preliminary and final energy balances results in regular recalculations in the inventory submission for the following year. The ERT considers that this reduces the accuracy and quality of the emission estimates in the energy sector, particularly when the recalculations are substantial. The ERT encourages Germany to endeavour to improve the timelines of the final energy balance and seek ways to ensure that the final inventory submission reflects the final energy data, to the extent possible.

20. Germany has generally implemented the recommendations from the 2013 annual review report in the 2014 annual submission. The manner in which the recommendations have been implemented over the past years is transparently described in the relevant chapters of the NIR, including chapter 10 on recalculations and improvements. The responses received by the ERT during the review also indicated that Germany has made, and continues to make, substantial quality improvements in the reporting of the energy sector. The ERT commends Germany for this achievement and recommends that the Party continue improving its inventory of the energy sector in future annual submissions, not only by implementing the recommendations made in the 2014 annual review report but also as a result of its own quality improvements.

21. Germany's 2014 annual submission for the energy sector is transparent, consistent and complete and has been prepared in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). However, the ERT found that the Party's reporting on the energy sector could be improved in relation to the comparability of its emission estimates and emission factors (EFs) with those of other Parties included in Annex I to the Convention (Annex I Parties). The ERT notes there has been no change regarding the recommendation made in the 2013 annual review report that

Germany assess the possibility of preparing emission data at the level of disaggregation in the CRF tables.[5] During the review, the Party explained that it does not believe that the inventory quality would improve by providing the relevant breakdown of industrial activities in the CRF tables. Germany provided a detailed line of reasoning on why it believes that comparability with other Annex I Parties would not improve by reporting emission estimates for manufacturing industries and construction according to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines). This is mainly a result of the reporting of autoproduction (e.g. combined heat and power plants, which are part of industrial installations), the size of the plants (e.g. thresholds), ownership issues, as well as feedback between industrial installations and the main electricity producers (e.g. industrial plants selling electricity back to the main activity producers). The ERT partly agrees with Germany's reasoning and appreciates the difficulties involved in allocating the fuel to the appropriate subcategories in the CRF tables, but still notes that emissions from autoproducers are to be assigned to the category where they were generated. The ERT also notes that the comparability of emission estimates and EFs, at the required level of disaggregation provided in the CRF tables, is one of the quality criteria provided in the UNFCCC reporting guidelines. In addition, as Germany already reports the required breakdown to the Statistical Office of the European Union (Eurostat) under the European Union (EU) Regulation No 147/2013 on energy statistics, it should be possible for Germany to report the emissions using the required CRF breakdown. The ERT recommends that Germany endeavour to allocate and report the fuel and emissions to the subcategories as provided in the CRF tables in its future annual submissions, without jeopardizing the accuracy of its emission estimates.

22. Data from the European Union Emissions Trading System (EU ETS) are not treated as statistical data but as administrative data, and are therefore not used in the energy balance. The energy balance prepared by AGEB captures all energy consumption in the country, including energy use by installations covered by the EU ETS – although these installations are not surveyed separately. During the review, Germany indicated that a comparison between the EU ETS fuel data and data from the energy statistics at an aggregated level shows a satisfactory match and, therefore, there is no indication of an underestimation of emissions. The use of EU ETS data in the national energy balance would require a very detailed comparison at the plant and category levels. This is complicated by a different reporting structure and partly different allocation to European Nomenclature of Economic Activities (NACE) codes in both systems for a single plant. The Party notes that the main purpose of the EU ETS data is the determination of high-quality plant-specific CO_2 emissions but not the creation of statistical data. The EU ETS data are useful for the determination of CO_2 EFs and emission estimates for non-energy use. The ERT concludes that the EU ETS data are used generally for verification and quality assurance (QA) purposes but are not used directly in the Party's inventory.

23. During the review, the ERT asked the Party to explain whether the GHG inventory compiler has access to the activity data (AD) and EFs from EU ETS installations at the level required to perform such verification of emissions based on energy statistics, and also asked which body is responsible for the QA of emission estimates for the energy sector reported in the GHG inventory based on EU ETS data. The Party explained that the German inventory compiler has no access to plant-specific EU ETS data, or to plant-specific statistical data. The responsibility for the QA of data collected under the EU ETS lies strictly with the national emissions trading authority. The inventory compiler has

[5] FCCC/ARR/2013/DEU, paragraph 24.

initiated activities to perform the verification of aggregated data collected under the EU ETS with those used for the compilation of the inventory. The ERT notes that this is a very big task given the number of installations, legal restrictions and different responsibilities within the Quality System for Emissions Inventories. During the review, Germany also indicated that it has already started a discussion between the Federal Statistical Office, the single national entity (the coordinating agency for the national system) and EU ETS authorities to extend the cooperation regarding the QA of the EU ETS data and energy statistics. The ERT welcomes this improvement and recommends that Germany report on the comparison of these data at an aggregated level, in its future annual submissions.

24. The ERT also notes that there are different streams of reporting obligations for the collection of plant-specific and/or installation-specific data and that some of the planned comparisons referred to above could be limited by confidentiality issues. The ERT is of the view that the GHG inventory compiler should have access to any data that allow the Party to improve the quality of its GHG emissions inventory, including for QA and quality control (QC) purposes. The ERT also considers that the new reporting requirements for the energy sector, the ongoing and planned quality inventory improvements and the thoroughness of the reviews will also place additional demands on the inventory compiler. Therefore, the ERT recommends that the Party facilitate or ensure that prompt access is provided to the inventory compiler to allow the performance of these comparisons of plant-level data in future annual submissions.

25. The ERT notes that some of the uncertainties reported in the NIR are relatively large. For example, the uncertainty of the AD related to CO_2 emissions from road transportation is around 9 per cent and the uncertainties for the residential and commercial categories are around 8 per cent. The ERT notes that these are very large emission sources and well-established statistical flows in the energy balance. During the review, the Party explained that the uncertainty of 8 per cent for the residential and commercial categories takes into account the uncertainty of the net calorific value (NCV) and the AD. The ERT notes that accurate and reliable AD are prerequisites for the calculation of good-quality emission estimates for the energy sector. The ERT recommends that Germany prioritize its inventory improvements so as to obtain more reliable AD and/or to reduce the uncertainties for the categories residential and commercial as well as for road transportation in order to improve the accuracy of the inventory.

26. With regard to QA/QC procedures, the NIR states that "Due to a lack of relevant specialized staff, it has not yet been possible to have source category experts carry out quality control and quality assurance for the area of CO_2 emission factors". The ERT asked the Party to clarify whether this statement refers to category-specific (tier 2) QC procedures during the inventory preparation process and/or to QA activities performed by personnel not directly involved in the inventory preparation process. The Party responded that all CO_2 EFs and NCVs are thoroughly checked by an experienced expert, including comparisons with IPCC default values, the EFs of other countries and EFs based on EU ETS data. The Party also explained that there are regular discussions with the Federal Statistical Office and the industry about NCVs and the composition of special gases. The ERT found that no experts outside the inventory team are involved in the performance of regular QA/QC procedures and considers that QA checks would further enhance the quality of the Party's GHG inventory. The ERT encourages Germany to establish a process for external QA of its annual submissions.

2. Reference and sectoral approaches

27. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 28–30 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross-references*
Difference between the reference approach and the sectoral approach	Energy consumption: 147.60 PJ, 1.54% CO_2 emissions: –6 201.75 Gg CO_2, –0.81%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Generally	See paragraph 28 below
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Generally	See paragraph 29 below
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Generally	See paragraph 30 below

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

28. The energy statistics reported by Germany to Eurostat under the EU regulation on energy statistics show that, in 2012, gas consumption by households was 2.4 per cent higher according to the Eurostat data than in the data reported to the UNFCCC (905,134 TJ compared with 883,630 TJ). The difference in consumption of liquid fuels was 3.6 per cent: higher in the Eurostat data (545,477 TJ) than in the data reported in the CRF tables (525,833 TJ). Finally, the difference in consumption of liquid fuels in the commercial sector was even greater (36.9 per cent): 308,317 according to the Eurostat data compared with 194,647 reported in the CRF tables. During the review, the Party informed the ERT that data pertaining to the Joint Annual Questionnaires, which are submitted to both Eurostat and the International Energy Agency, have to be reported by the end of November when the final energy data are not yet available in Germany. The ERT notes that these differences partly reflect the reporting of 'preliminary' energy statistics to Eurostat by 30 November, which are more up to date, compared with the 'preliminary' energy statistics that are made available to the inventory compiler in August. The ERT recommends that the Party ensure as much consistency as possible between the energy data reported in the CRF tables and the data reported internationally in its annual submission, and that the Party provide explanations in the NIR for any large deviations of, for example, more than 2 per cent in total fossil fuel consumption, as required in the UNFCCC reporting guidelines.

International bunker fuels

29. As mentioned in previous review reports, Germany cannot distinguish the amount of bunker fuel that is used for international transport on inland waterways (such as on the Rhine river) from that used for domestic navigation because of a lack of statistical data. The ERT notes that the approach followed by Germany leads to an overestimation of emissions from navigation as all fuel and emissions are considered domestic and reported under navigation. During the review, Germany explained that no statistics are available to report

this breakdown. The IPCC good practice guidance also requires that estimates are accurate in the sense that they do not systematically overestimate or underestimate true emissions or removals. The ERT recommends that the Party collect the necessary data, or estimate these data using other methods, in order to correctly allocate emissions from domestic and international bunkers to the relevant categories in the CRF tables.

Feedstocks and non-energy use of fuels

30. The ERT found some inconsistencies in the Party's reporting of non-energy use of fuels among CRF tables 1.A(b), 1.A(c) and 1.A(d), including in the use of the notation keys (e.g. "NA" (not applicable) instead of "NO" (not occurring)). For example, the sum of total carbon stored reported in CRF table 1.A(b) (67,777.26 Gg CO_2) is not equal to the sum of CO_2 not emitted reported in CRF table 1.A(d) (68,429.68 Gg CO_2). Also, the difference between the apparent consumption and the apparent consumption excluding non-energy use and feedstocks reported in CRF table 1.A(c) (1,109,155 TJ) is not equal to the sum of all fuel quantities reported in CRF table 1.A(d) (1,116,767 TJ). In addition to these findings regarding the consistency of the reported information, the ERT considers that the reporting of non-energy use of fuels and feedstocks could be improved in relation to transparency. For example, the relevant information in the last three columns of CRF table 1.A(d) (i.e. subtracted from energy sector, associated CO_2 emissions and allocated under) has not been reported. The ERT considers that ensuring access to this information by the inventory compiler is important for improving the transparency of the reporting of the energy and industrial processes sectors. The ERT recommends that the Party seek ways to gain access to the information required, to ensure the complete and accurate reporting of feedstocks and non-energy use of fuels in the CRF tables, and that the Party improve the consistency among CRF tables 1.A(b), 1.A(c) and 1.A(d) in its future annual submissions.

3. Key categories

Stationary combustion: all fuels – CO_2, CH_4 and N_2O

31. Germany reported a consumption of solid fuels equivalent to 191,340 TJ in 2012 for iron and steel. For the same year, the data reported to Eurostat show a consumption of 363,690 TJ. The Party explained that this difference is a result of the different reporting structure in the GHG inventory compared with the national energy statistics. The ERT notes that the AD used to estimate emissions from iron and steel in Germany include coke breeze, hard coal use of sinter plants, blast furnace gas and basic oxygen furnace gas, as well as coke oven gas used in power plants and in boilers of the different steel-making processes. Also, an important part of the emissions from solid fuels is reported under iron and steel production in the industrial processes sector. During the review, the ERT asked Germany to provide the carbon balance for the iron and steel category. The Party responded that the current reporting structure, as well as the carbon balance, is the result of the in-country review conducted in 2010. The carbon balance shows that the output is indeed higher than the input, with a very high statistical difference. The Party explained that there was an intensive discussion with the Iron and Steel Association and the Federal Statistical Office to determine the exact reason for this inconsistency. The reason for the imbalance is an overestimation of the blast furnace gas volume as a result of high measurement uncertainties. The ERT notes that Germany is planning to revise its calculation method and increase the consistency with the EU ETS data in its 2015 annual submission. The ERT welcomes this planned improvement and recommends that Germany provide transparent information on its calculation method, as well as on the carbon balance for iron and steel, in its annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

32. In 2012, emissions from the industrial processes sector amounted to 68,253.85 Gg CO_2 eq, or 7.3 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,756.08 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 30.3 per cent in the industrial processes sector, and decreased by 61.3 per cent in the solvent and other product use sector. The key drivers for the decrease in emissions in the industrial processes sector since 1990 are the decreased production in the metal industry (iron and steel industry) and in the chemical industry (increased thermal N_2O decomposition from adipic acid production). Within the industrial processes sector, 29.2 per cent of the emissions were from the chemical industry, followed by 27.8 per cent from mineral products, 24.4 per cent from metal production and 18.2 per cent from consumption of halocarbons and SF_6. Production of halocarbons and SF_6 accounted for 0.2 per cent. The remaining 0.2 per cent were from other (industrial processes). Emissions from industrial processes (other production) were reported as "NO".

33. Germany has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Germany between the 2013 and 2014 annual submissions was in the following category: mineral products. The recalculation was made in response to the 2013 annual review report following a review of production data from the national statistics and EU ETS methodological differences. Compared with the 2013 annual submission, the recalculations decreased emissions in the industrial processes sector by 43.88 Gg CO_2 eq (0.06 per cent), and decreased total national emissions by 0.005 per cent. The recalculations were adequately explained.

34. The ERT noted that Germany has improved the transparency and accuracy of its inventory reporting on the industrial processes sector by implementing most of the recommendations from the previous review report (e.g. Germany recalculated the emissions from commercial refrigeration, industrial refrigeration, stationary air-conditioning systems and mobile air-conditioning systems after the introduction of a new model and data collection method). However, further improvements to enhance transparency are necessary and are detailed in the following paragraphs.

2. Key categories

Lime production – CO_2

35. Germany uses lime production data to estimate CO_2 emissions for the entire time series. The estimated emissions and collected production-quantity data were compared with findings from the EU ETS and with national statistical data. Responding to recommendations made in previous review reports, Germany reported on the analysis of the differences between the CO_2 emissions reported in the NIR and those from the EU ETS. Germany has reported in the NIR that these comparisons have revealed a need for further review of the EU ETS methodology. The ERT reiterates the recommendation made in the previous review report that Germany provide an explanation of the EU ETS methodology and the EFs used to calculate CO_2 emissions from lime production in its annual submission. The ERT also encourages Germany to report information on the further review of the EU ETS methodology.

Adipic acid production – N_2O

36. In Germany, emissions from adipic acid production were estimated based on IPCC default EFs and the amount of adipic acid produced until the mid-1990s. In recent years,

the emissions were estimated using confidential AD. The NIR reports that there are three facilities producing adipic acid and these facilities have installed abatement technologies for which no description has been provided. The ERT reiterates the recommendations made in previous review reports that Germany improve the description of the methodological issues related to the calculation of N_2O emissions for the years for which the IPCC default EFs were used, and the methods used to calculate N_2O emissions at each plant in its annual submission.

Iron and steel production – CO_2

37. In iron and steel production, the ERT noted that the trend in the CO_2 implied emission factor (IEF) decreased by 22.7 per cent between 2004 (0.48 t/t) and 2012 (0.37 t/t). Also, several large inter-annual changes were identified, including for the years 1994/1995 (74.9 per cent), 1999/2000 (12.4 per cent), 2000/2001 (–11.0 per cent), 2001/2002 (–14.0 per cent), 2002/2003 (31.4 per cent), 2003/2004 (9.8 per cent) and 2006/2007 (–12.3 per cent). During the review, Germany explained that the inter-annual fluctuations are caused by the reallocation of fuel provided from the blast furnace from the category iron and steel in the energy sector to the category iron and steel production in the industrial processes sector, and by changes in production. The Party also explained that because the allocation methods are different, the aggregation of steel, pig iron and sinter production for the determination of the IEF could lead to incorrect conclusions. The ERT agrees with the explanation and recommends that Germany include it in its annual submission.

Fugitive emissions – HFCs

38. Germany has reported hydrofluorocarbon-23 (HFC-23) emissions as "NA" under by-product emissions in CRF table 2(II).E, while other HFCs are reported as "C" (confidential) and "NO" under fugitive emissions. There is no information in the NIR that shows that direct production of HFC-23 occurs in Germany. In response to questions raised by the ERT during the review, Germany agreed that it has used the incorrect notation keys. The ERT recommends that Germany correct the use of the notation keys (reporting "NO" instead of "NA") for HFC-23 emissions.

D. Agriculture

1. Sector overview

39. In 2012, emissions from the agriculture sector amounted to 69,490.36 Gg CO_2 eq, or 7.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 20.9 per cent. The key drivers for the fall in emissions are the decreasing animal numbers (mostly cattle and sheep), improvements in waste management systems and manure application management, and decreasing use of synthetic fertilizer. Within the sector, 58.9 per cent of the emissions were from agricultural soils, followed by 30.0 per cent from enteric fermentation. The remaining 11.1 per cent were from manure management. Emissions from rice cultivation, prescribed burning of savannah and field burning of agriculture residue were reported as "NO".

40. Germany has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations made by Germany between the 2013 and 2014 annual submissions were in the following categories: enteric fermentation, manure management and agricultural soils. The recalculations were made following changes in AD and EFs. Compared with the 2013 annual submission, the recalculations, increased emissions in the agriculture sector by 2.90 Gg CO_2 eq (0.004 per cent) (CH_4 emissions increased by 128.01 Gg CO_2 eq (0.5 per cent) and N_2O emissions decreased by 125.11 Gg CO_2 eq (0.3 per cent)), and increased total national emissions by 0.0003 per cent. The

recalculations were adequately explained. The recalculations made in comparison with the 2013 annual submission but also in comparison with the beginning of the first commitment period of the Kyoto Protocol are provided in the NIR in separate tables. The Party explained that these recalculations led to an increase in the accuracy of the inventory; however, the differences are negligible in comparison with the previous annual submission.

41. The NIR includes a separate section describing the different data sources, database and statistics used for the estimation of the AD (mainly animal numbers). The ERT noted that in several animal categories (i.e. poultry, goats and horses) the AD were not available for the latest reporting year (i.e. 2012) and, therefore, the same values as for 2011 were used to estimate the emissions. The ERT also noted several discrepancies with the international statistics published in the database of the Statistics Division of the Food and Agriculture Organization of the United Nations (FAOSTAT). During the review, Germany provided an additional document regarding the comparison of data published in FAOSTAT with the national background data on goats, horses, sheep, pigs and poultry, and information that justifies the differences (e.g. meat production in Germany). The ERT agrees with the explanation provided and recommends that Germany include it in the annual submission. The ERT also recommends that Germany explore the possibility of having animal numbers for the latest year available for the reporting of its GHG inventory in the annual submission.

42. The ERT welcomes the improvement in the NIR of the description of the models, country-specific parameters and EFs used for the categories in the agriculture sector. The ERT commends Germany for such improvements and encourages the Party to continue with this approach in future annual submissions.

2. Key categories

Enteric fermentation – CH_4

43. In response to a recommendation made in the previous review report, Germany has made improvements in the reporting of gross energy intake for dairy and non-dairy cattle and swine. The ERT welcomes these improvements from Germany. Germany estimates CH_4 emissions from this category using a combination of tier 3 (dairy cattle), tier 2 (other cattle and swine) and tier 1 (other animals) methods. The country-specific methodology (in particular the use of a country-specific methane conversion factor) leads to one of the highest IEFs for dairy cattle (134.61 kg CH_4/head/year) among all reporting Parties (82.57–134.61 kg CH_4/head/year). The ERT also welcomes the description of the QA procedures, and considers it to be very useful and transparent.

Manure management – CH_4

44. In response to a recommendation made in the previous review report, Germany has made improvements in the reporting of emissions from biogas plants and in providing information on the share of slurry digested, disaggregated by cattle and swine. The ERT commends Germany for these improvements and considers the explanation provided transparent. The ERT encourages Germany to include references for the most recent scientific papers and measurements in this area in the annual submission.

Manure management – N_2O

45. Germany uses an N_2O IEF for solid storage and dry lot (0.0091 kg N_2O-N/kg N) which is lower than the IPCC default value (0.02 kg N_2O-N/kg N). In response to questions raised by the ERT during the review, Germany provided additional information about the methodology used to estimate a country-specific EF for solid manure ("N_2O emissions from solid manure storage. Calculation of a national emission factor"). The ERT reiterates the recommendation made in the previous review report that Germany include a detailed

and transparent justification for the use of the country-specific EF for solid manure in the annual submission.

Agricultural soils – N_2O

46. The ERT noted that N_2O emissions from synthetic fertilizers in Germany are not calculated based on the IPCC methodology using fraction of synthetic fertilizer nitrogen applied to soils that volatizes as ammonia and nitrogen oxides ($Frac_{GASF}$), but on a country-specific methodology. This methodology uses the total amount of fertilizer sold in the previous year, and ammonia and nitric oxide emissions are estimated using the GAS-EM model. The model is described in the NIR and works on the basis of the nitrogen-flow concept. Following the recommendation made in the previous review report, Germany has included an additional explanation of the GAS-EM model in the NIR. The ERT agrees that the description provided in the NIR is transparent and correct.

E. Land use, land-use change and forestry

1. Sector overview

47. In 2012, net removals from the LULUCF sector amounted to 3,487.84 Gg CO_2 eq. Since 1990, net removals have decreased by 85.8 per cent. The key driver for the fall in removals is the decline in the rates of removals occurring in forest land remaining forest land. Within the sector, 51,783.61 Gg CO_2 eq of net removals were from forest land. Net emissions of 31,689.80 Gg CO_2 eq were from cropland, followed by 10,117.68 Gg CO_2 eq from grassland, 4,149.36 Gg CO_2 eq from settlements and 2,277.90 Gg CO_2 eq from wetlands. The remaining 61.04 Gg CO_2 eq of net emissions were from other (LULUCF).

48. Germany has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Germany between the 2013 and 2014 annual submissions were in the following categories: forest land remaining forest land and land converted to settlements. The recalculations were made following changes in AD and EFs. Compared with the 2013 annual submission, the recalculations decreased emissions in the LULUCF sector by 13,421.20 Gg CO_2 eq (143.8 per cent). The recalculations were adequately explained.

2. Key categories

Forest land remaining forest land – CO_2

49. During the period 1990–2012, emissions from forest land remaining forest land increased by 16,379.09 Gg CO_2 eq/year from –63,332.15 Gg CO_2 eq in 1990 to –47,074.09 Gg CO_2 eq in 2012. The carbon stock change method used by Germany integrates the gains and losses of carbon stocks over the time period between inventory years. The increase in emissions over the period 1990–2012 was the result of a generally high rate of harvesting in the period 2000–2012, which is broadly reflected in the inventory results obtained from the national forest inventory (NFI) in 2012. The forest inventory method underestimates the amount of roundwood production by up to 35 per cent based on the national statistics. In response to a question raised by the ERT during the review, Germany explained that wood harvested is considered implicitly by the inventory method. The ERT sought information that would aid the transparency of reporting of emissions on forest land, specifically in relation to harvesting activity. In response to a draft version of this report, Germany stated that "German logging statistics is flawed. It is not based on measurements, but partly on expert judgments with a very high uncertainty and has been considered inappropriate for

inventory purposes by the national logging and timber trade experts".[6] Taking this concern into account, and in order to improve the transparency of reporting, the ERT recommends that Germany undertake a verification of the outputs of the NFI, particularly with respect to forest harvesting/production. Consistent with IPCC guidance, this verification should include a comparison of inventory estimates with independent assessments.

Land converted to forest land – CO_2

50. Emissions from land converted to forest land have increased by 19 per cent over the period 1990–2012, from –5,878.56 Gg CO_2 eq in 1990 to –4,776.83 Gg CO_2 eq in 2012. While the IEF for the carbon stock changes in living biomass was relatively constant over this period, the area of land converted to forest land decreased from 606.20 kha in 1990 to 400.18 kha in 2012. This decline occurred because the rate of land conversion to forest land decreased during that period. As a result, land is moving from the category land converted to forest land to the category forest land remaining forest land at a higher rate than it is being replaced with new land converted to forest land. To more clearly understand these trends in emissions, the ERT asked the Party a number of questions related to land conversions during the review. The ERT recommends that Germany more transparently describe its land classification system in its annual submission.

F. Waste

1. Sector overview

51. In 2012, emissions from the waste sector amounted to 13,552.56 Gg CO_2 eq, or 1.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 68.1 per cent. The key driver for the fall in emissions is the implementation of legal provisions relating to waste management. Namely, in June 2005, in keeping with new, stricter requirements under the Ordinance on Environmentally Compatible Storage of Waste from Human Settlements (*Abfallablagerungsverordnung*) and the Landfill Ordinance (*Deponieverordnung*), more than half of all landfills were closed. Those regulations have extensively reduced CH_4 emissions from such facilities. Within the sector, 75.3 per cent of the emissions were from solid waste disposal on land, followed by 17.8 per cent from wastewater handling. The remaining 6.9 per cent were from other (waste).

52. Germany has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculation made by Germany between the 2013 and 2014 annual submissions was in the following categories: other (waste), wastewater handling and municipal wastewater treatment. The recalculation was made for the years 1990–2011 in order to comply with an applied adjustment of the methane correction factor to the climatic conditions prevailing in Germany. Compared with the 2013 annual submission, the recalculations increased emissions in the waste sector by 11.26 Gg CO_2 eq (0.1 per cent), and increased total national emissions by 0.001 per cent. The recalculations were adequately explained.

2. Key categories

Solid waste disposal on land – CH_4

53. Germany has reported the fraction of municipal solid waste (MSW) disposed using the notation key "NE" (not estimated) in the CRF tables. The ERT considers that this is not

[6] Dieter M and Englert H. 2005. *Gegenüberstellung und forstpolitische Diskussion unterschiedlicher Holzeinschlagsschätzungen für die Bundesrepublik Deutschland.* Arbeitsbericht des Instituts für Ökonomie 2005/2, Bundesforschungsanstalt für Forst und Holzwirtschaft, Institut für Ökonomie.

in accordance with the UNFCCC reporting guidelines. In response to a question raised by the ERT during the review, the Party explained that as a result of regulations in force since June 2005, the landfilling of biodegradable waste is no longer permitted in Germany. The outcome of this is that municipal waste and other biodegradable waste must be pre-treated via thermal or mechanical biological processes and the fraction of MSW disposed has been zero since that time. The ERT recommends that Germany include this information in the additional information box of the relevant CRF table (currently CRF table 6.A,C) and change the notation key accordingly.

Wastewater handling – CH_4 and N_2O

54. During the review, the ERT noted that there were errors in the formula described in the NIR and the AD presented were not consistent across the annual submission. In response to questions raised by the ERT during the review, Germany explained that the AD have been completely updated to reflect 2012 values and were used in the correct formula, but the values were not correctly described in the NIR. The ERT recommends that Germany correct the values in the annual submission.

55. Germany has included more information on the use of sewage sludge from biological wastewater treatment in the NIR in response to the encouragement made in the previous review report. The ERT commends Germany for the improvements made in introducing such information in the 2014 annual submission.

3. Non-key categories

Other (waste) – CH_4 and N_2O

56. The ERT noted that the EF for waste composting is high compared with other reporting Parties. This issue was raised by the ERT during the review and the Party explained that research projects relating to this issue are currently under way and that improved data will be reported as they become available. The ERT recommends that Germany report this information in its next annual submission.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

57. Table 6 provides an overview of the information reported and parameters selected by Germany under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4, of the	Activities elected: forest management	

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Kyoto Protocol	Years reported: 2008, 2009, 2010, 2011, 2012	
Period of accounting	Commitment period accounting	
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

58. Chapter G.I includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 59–63 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

59. During the first commitment period, Germany reported an average rate of net removals due to afforestation and reforestation of 5,682.16 Gg CO_2 eq/year. This activity occurred on 491,105.88 ha. Recalculated values of net removals have been included in the 2014 annual submission and the average recalculation over the period 2008–2011 is 0.6 per cent. The recalculations were made primarily owing to the availability of data from the 2012 NFI.

60. Within the afforestation and reforestation classification, Germany includes other land converted to forest land. Other land is generally considered as an unmanaged type of land use and, therefore, this creates uncertainty as to whether forests growing on the other land classification were directly human-induced. In response to a question raised by the ERT during the review, Germany stated that around 6,000 ha of other land converted to forest land is included in the afforestation and reforestation classification. The information included in the NIR explains that all land areas of Germany are subject to land-use plans and that the preparation of, and compliance with, the plans is monitored by the federal government authorities, the Länder and individual municipalities. Therefore, the ERT concludes that all land conversions to forest land in Germany may be considered to be directly human-induced.

Deforestation – CO_2

61. During the first commitment period, Germany reported average annual net emissions of 2,283.19 Gg CO_2 eq/year. The deforestation area and emission estimates were subject to a significant recalculation in the 2014 annual submission. The average annual recalculation over the first commitment period was 515 per cent for deforestation area and 1,691.9 per cent for emissions. These recalculations were primarily undertaken following the

availability of the results from the third NFI, which provided a basis for more accurate estimates of deforested area and on-site biomass on deforested land. The ERT recommends that Germany provide more detail on the individual effects of new data and methodologies on the time series in its next recalculation of deforestation emissions.

62. Germany reported in CRF table 5(KP-I)A2.1 the total area of deforestation as otherwise subject to elected activities under Article 3, paragraph 4, of the Kyoto Protocol. The ERT noted that the Party misinterpreted the purpose of the table. The ERT recommends that Germany report deforested land in the relevant CRF table only if it is concurrently included in an activity under Article 3, paragraph 4, of the Kyoto Protocol.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

63. All forests in Germany, except those classified under afforestation or reforestation, were included within the forest management activity. By 2012, net removals on forest management land were estimated to amount to 46,692.65 Gg CO_2 eq from 10.76 million ha of forest land. The forest management removal estimates were subject to a significant recalculation in the 2014 annual submission. The average annual recalculation of forest management removals over the first commitment period was 68.5 per cent. This recalculation increased net removals from forest management land by an average of 18,978.24 Gg CO_2 eq/year throughout the first commitment period. This recalculation was primarily undertaken following the availability of the results of the third NFI, which provided a basis for more accurate estimates of on-site biomass. In response to a draft version of this report, Germany explained that "before the new data of the NFI 2012 became available, the removals on forest management land were estimated up to submission 2013 by applying the same removal rate as between 2002 and 2008 (extrapolation method), when harvest rates were very high. The logging statistics – with all their flaws and uncertainties – had suggested for years that harvest rates have declined since then, which is supported by lower timber prices". The ERT agrees with Germany that declines in logging activity may help to explain the increase in removals on forest management land during the first commitment period. Taking this suggestion into account the ERT recommends that Germany undertake a verification of the outputs of the NFI, particularly with respect to forest harvesting/production. Consistent with IPCC guidance, this verification should include a comparison of inventory estimates with independent assessments.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

64. Germany has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

65. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent

[7] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

66. Germany has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

67. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq[a]

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–28 410 778		–28 410 778
Harvested land	NA, NO		NA, NO
Deforestation	11 415 948		11 415 948
Forest management	–22 733 333		–22 733 333
Article 3.3 offset[c]	0		0
Forest management cap[d]	22 733 333		–22 733 333
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[4] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

68. Based on the information provided in table 7 for the activity afforestation and reforestation, Germany shall for non-harvested land issue 28,410,778 removal units (RMUs) in its national registry. Neither issuance nor cancellation is required for harvested land, as units of land harvested are reported as "NA, NO".

69. Based on the information provided in table 7 for the activity deforestation, Germany shall cancel 11,415,948 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

70. Based on the information provided in table 7 for the activity forest management, Germany shall issue 22,733,333 RMUs in its national registry.

Calculation of the commitment period reserve

71. Germany has reported its commitment period reserve in its 2014 annual submission. Germany reported that its commitment period reserve has not changed since the initial report review (4,381,287,024 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

72. Germany reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

73. Germany reported that there are changes in its national registry since the previous annual submission. The changes were already in effect but not adequately described in the 2013 NIR. The additional information, provided during the 2013 review, is now reported as a change in the national registry in the 2014 annual submission. The ERT concluded that, taking into account the confirmed changes in the national registry, the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

74. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Germany provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

75. Germany's description of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission is the same as the reporting in the 2013 NIR. The ERT noted that Germany did not provide information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its annual submission. Although noting that changes have not been reported, the ERT concluded that the

information provided continues to be complete and transparent. The ERT reiterates the recommendation made in the previous review report that the Party report any changes in the information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP.

76. The description of the activities under Article 3, paragraph 14, as contained in the report of the individual review of the annual submission of Germany submitted in 2013,[8] therefore remains relevant.

III. Conclusions and recommendations

A. Conclusions

77. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Germany, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Germany

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The ERT concludes that the inventory submission of Germany is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Germany has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	Table 4
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	

[8] See FCCC/ARR/2013/DEU, paragraphs 87–88.

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	No	75

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

78. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified. The ERT notes that this review report of the 2014 annual submission will be published after 15 April 2015. Where recommendations cannot be fully implemented in time for the 2015 annual submission, the ERT recommends that the Party provide an update on progress of implementation in the NIR.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Energy	Sector overview	Provide more detailed information on the major recalculations in the energy sector in future annual submissions and, to the extent possible, link the qualitative explanations for the major recalculations with the quantitative information reported in CRF table 8(a)	No	18
		Continue improving the inventory of the energy sector in future annual submissions, not only by implementing the recommendations made in the 2014 annual review report but also as a result of Germany's own quality improvements	No	20
		Endeavour to allocate and report the fuel and emissions to the subcategories as provided in the CRF tables, without jeopardizing the accuracy of the emission estimates	No	21
		Report on the verification of the aggregated data collected under EU ETS with those used for the inventory compilation comparison, at an aggregated level	No	23
		Facilitate or ensure that prompt access to plant-specific data is provided to the inventory compiler to allow a comparison of plant-level data	No	24
		Prioritize the inventory improvements so as to obtain more reliable AD and/or to reduce the uncertainties for the categories residential and commercial as well as for road transportation in order to improve the accuracy of the inventory	No	25
	Comparison of the reference approach with the sectoral approach and international statistics	Ensure as much consistency as possible between the energy data reported in the CRF tables and the data reported internationally in the annual submission, and provide explanations in the NIR for any large deviations of, for example, more than 2 per cent in total fossil fuel consumption, as required in the UNFCCC reporting guidelines	No	28
	International bunker fuels	Collect the necessary data, or estimate these data using other methods, in order to correctly allocate emissions from domestic and international bunkers to the relevant categories in the CRF tables	No	29
	Feedstocks and non-energy use of fuels	*Seek ways to gain access to the information* required to ensure the complete and accurate reporting of feedstocks and non-energy use of	*No*	30

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
		fuels in the CRF tables, and improve the consistency among CRF tables 1.A(b), 1.A(c) and 1.A(d)		
	Stationary combustion: all fuels – CO_2, CH_4, N_2O	Provide transparent information on the calculation method as well as on the carbon balance for iron and steel	No	31
Industrial processes and solvent and other product use	Lime production – CO_2	Provide an explanation of the EU ETS methodology and the EFs used to calculate CO_2 emissions from lime production	Yes	35
	Adipic acid production – N_2O	Improve the description of the methodological issues related to the calculation of N_2O emissions for the years for which the IPCC default EFs were used, and the methods used to calculate N_2O emissions at each plant	Yes	36
	Iron and steel production – CO_2	Include, in the annual submission, an explanation for the large inter-annual changes in the CO_2 IEF, as provided to the ERT during the review	No	37
	Fugitive emissions – HFCs	Correct the use of the notation keys ("NO" instead of "NA")	No	38
Agriculture	Sector overview	Include, in the annual submission, information on the comparison of data published in FAOSTAT with the national background data on goats, horses, sheep, pigs and poultry, and information that justifies the differences (e.g. on meat production in Germany)	No	41
		Explore the possibility of having animal numbers for the latest year available for the reporting of the GHG inventory	No	40
	Manure management – N_2O	Include proper detailed and transparent justification for the use of the country-specific EF for solid manure	Yes	45
LULUCF	Forest land remaining forest land – CO_2	Undertake a verification of the outputs of the NFI, particularly with respect to forest harvesting/production	No	49
	Land converted to forest land – CO_2	More transparently describe the land classification system in the annual submission	No	50
Waste	Solid waste disposal on land	Include information in the additional information box of the relevant CRF table (currently CRF table 6.A,C) explaining that the fraction of	No	53

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
	– CH_4	biodegradable municipal solid waste disposed in landfill is zero and change the notation key accordingly		
	Wastewater handling – CH_4 and N_2O	Correct the AD values in the annual submission	No	54
KP-LULUCF	Deforestation – CO_2	Provide more detail on the individual effects of new data and methodologies on the time series in the next recalculation of deforestation emissions	No	61
		Report deforested land in the relevant CRF table (currently CRF table 5(KP-I)A2.1) only if it is concurrently included in an activity under Article 3, paragraph 4, of the Kyoto Protocol	No	62
	Forest management – CO_2	Undertake a verification of the outputs of the NFI, particularly with respect to forest harvesting/production	No	63
Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol		Report any changes in the information provided under Article 3, paragraph 14, in accordance with decision 15/CMP.1, annex, chapter I.H, and/or further relevant decisions of the CMP	Yes	75

Abbreviations: AD = activity data, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, FAOSTAT = database of the Statistics Division of the Food and Agriculture Organization of the United Nations, GHG = greenhouse gas, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NFI = national forest inventory, NIR = national inventory report, NO = not occurring, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

IV. Questions of implementation

79. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	4 381 287 024			4 381 287 024
Annex A emissions for 2012				
CO_2	821 717 693			821 717 693
CH_4	48 706 169			48 706 169
N_2O	55 797 879			55 797 879
HFCs	9 345 589			9 345 589
PFCs	208 947			208 947
SF_6	3 307 031			3 307 031
Total Annex A sources[c]	**939 083 309**			**939 083 309**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–6 134 045			–6 134 045
3.3 Afforestation and reforestation on harvested land for 2012	NO			NO
3.3 Deforestation for 2012	2 366 471			2 366 471
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012	–46 565 947			–46 565 947
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for the base year				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	810 441 126			810 441 126
CH_4	48 696 504			48 696 504
N_2O	56 846 441			56 846 441
HFCs	9 153 371			9 153 371
PFCs	241 441			241 441
SF_6	3 315 679			3 315 679
Total Annex A sources[c]	**928 694 563**			**928 694 563**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–5 892 688			–5 892 688
3.3 Afforestation and reforestation on harvested land for 2011	NO			NO
3.3 Deforestation for 2011	2 346 434			2 346 434
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011	–46 609 776			–46 609 776
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	829 401 504			829 401 504
CH_4	50 052 196			50 052 196
N_2O	54 561 732			54 561 732
HFCs	8 876 506			8 876 506
PFCs	302 292			302 292
SF_6	3 194 043			3 194 043
Total Annex A sources[c]	**946 388 274**			**946 388 274**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–5 652 402			–5 652 402
3.3 Afforestation and reforestation on harvested land for 2010	NO			NO
3.3 Deforestation for 2010	2 326 625			2 326 625
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010	–46 659 887			–46 659 887
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	785 602 586			785 602 586
CH_4	51 132 976			51 132 976
N_2O	63 139 955			63 139 955
HFCs	9 307 435			9 307 435
PFCs	357 825			357 825
SF_6	3 065 048			3 065 048
Total Annex A sources[c]	**912 605 827**			**912 605 827**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–5 400 099			–5 400 099
3.3 Afforestation and reforestation on harvested land for 2009	NO			NO
3.3 Deforestation for 2009	2 303 970			2 303 970
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009	–46 697 484			–46 697 484
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	851 111 467			851 111 467
CH_4	53 158 085			53 158 085
N_2O	63 140 583			63 140 583
HFCs	8 782 476			8 782 476
PFCs	495 525			495 525
SF_6	3 114 561			3 114 561
Total Annex A sources[c]	**979 802 698**			**979 802 698**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–5 331 544			–5 331 544
3.3 Afforestation and reforestation on harvested land for 2008	NO			NO
3.3 Deforestation for 2008	2 072 448			2 072 448
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008	–46 759 021			–46 759 021
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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FCCC/ARR/2013/DEU. Report of the individual review of the annual submission of Germany submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/deu.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Michael Strogies (Federal Environment Agency), including additional material on the methodology and assumptions used.

Annex III

Acronyms and abbreviations

AD	activity data
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
FAOSTAT	database of the Statistics Division of the Food and Agriculture Organization of the United Nations
$Frac_{GASF}$	fraction of synthetic fertilizer nitrogen applied to soils that volatizes as ammonia and nitrogen oxides
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
kha	kilohectares (1 kha = 1,000 ha)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MSW	municipal solid waste
N_2O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
t	tonne (1 t = 1,000 kg)
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change